REMARKS

All of the claims which are currently pending in this application (Claims 4 - 8 and 10 - 18) have now been rejected under 35 U.S.C. §102 or §103 as being anticipated by or obvious in view of Macy (U.S. 5,522,249). That same reference was cited in divisional application Serial No. 09/893,145, now U.S. Patent 6,701,785, and the product claims were found to be allowable over it.

While applicant's invention and Macy may both be concerned with the elimination of quadrature error, they do so in different ways. In Macy, the pickup electrodes are trimmed to produce an electrical null in the quadrature signal, whereas in applicant's invention balancing masses are utilized to eliminate quadrature vibration and to maintain a balance in mass between the tines. One is an electrical technique; the other is mechanical.

The electrical balancing technique of Macy is quite different than applicant's invention. In the single-ended tuning fork of Macy, piezoelectrically induced drive charge is present on the pickup electrodes. If this charge is not perfectly symmetrical in its distribution on the various pickup electrodes, there will be a net quadrature signal in the output since the drive charge signal is in quadrature phase relation to the rotation-induced Coriolis signal. By trimming away electrode area, an intentional change in the electrode symmetry is created to produce an electrical nulling of the quadrature signal.

Contrary to the Examiner's suggestion, the pickup electrodes in Macy are not balancing masses. Their function is to provide electrically conductive regions for sensing piezoelectrically induced charge, and their mass is insignificant. Such electrodes are typically only 100 - 200 nm thick, whereas balancing masses as employed in applicant's invention may be as thick as 10,000 nm and a relatively heavy metal such as gold.

The location of the pickup electrodes relatively close to the base of the tines in Macy also makes their mass less significant since they are farther away from the free ends of the tines which move with significantly more velocity than the areas near the base.

In contrast, in applicant's invention, there is a true mechanical balancing in which the mechanical properties of the tines are altered such that the actual quadrature displacement in the pickup mode of vibration is reduced or eliminated.

Claim 4 distinguishes over Macy in calling for the steps of forming a pair of elongated tines which have front and rear surfaces and are disposed symmetrically about an axis, and using balancing masses on the front surface of one tine and the rear surface of the other tine to reduce quadrature displacement in the tines and maintain a balance in mass between the tines. The electrodes shown in Macy are not balancing masses. They are not used to maintain a balance in mass between the tines, and there is no

suggestion of using balancing masses on the front surface of one tine and the rear surface of the other. Likewise, there is no suggestion of using balancing masses to reduce quadrature error. Hence, Macy neither anticipates nor renders the invention obvious.

Similarly, Claim 5 distinguishes over Macy in calling for the steps of forming a pair of elongated tines which have front and rear surfaces and are disposed symmetrically about an axis, applying mass elements to the tines, and removing portions of the mass elements from the front surface of one tine and from the rear surface of the other to reduce quadrature displacement in the tines and maintained a balance in mass between the tines. Macy does not teach or suggest the application of balancing masses, and it certainly does not show or suggest removing portions of the masses from the front surface of one tine and the rear surface of the other, and it likewise does not teach or suggest the removal of mass from such surfaces to reduce quadrature displacement or to maintain a balance in mass.

Claim 6 likewise distinguishes over Macy in calling for the steps of forming a pair of elongated tines which have front and rear surfaces and are disposed symmetrically about an axis, and adding mass elements to the front surface of one tine and the rear surface of the other tine to eliminate quadrature displacement in the tines and maintained a balance in mass between the tines. Here again, Macy does not teach or suggest the addition of mass elements to the front surface of one tine and the rear surface of the other, nor does it show or suggest the addition of mass elements to eliminate quadrature error or to maintain a balance in mass between the tines.

Claim 7 distinguishes over Macy in calling for the steps of forming a pair of elongated tines having free ends of increased lateral dimension with laterally offset balancing masses on opposite sides of the tines near the free ends, and adjusting the balancing masses on opposite sides of the two tines to reduce quadrature displacement in the tines and maintain a balance in mass between the tines. Macy does not show or suggest the formation of tines having either free ends of increased lateral dimension or laterally offset balancing masses on opposite sides of the tines near the free ends, nor does it show or suggest adjusting the balancing masses on opposite sides of the two tines to reduce quadrature displacement in the tines and maintain a balance in mass between the tines.

Claims 8 and 10 depend from Claim 7 and are directed to patentable subject matter for the same reasons as their parent claim. In addition, Claim 7 further distinguishes over Macy in specifying that the balancing masses are adjusted by removing substantially equal amounts of the balancing masses from the opposite sides of the tines, and Claim 10 further distinguishes in calling for the step of removing substantially equal amounts

of the balancing masses from same sides of the tines to adjust the drive mode frequency of the tuning fork.

Claim 11 distinguishes over Macy in calling for the steps of forming an elongated pair of drive tines having front and rear surfaces, forming a pair of pickup tines having front and rear surfaces, applying balancing masses to the front and rear surfaces of the drive tines, and trimming the balancing masses on opposite sides of the drive tines to reduce quadrature displacement without affecting mass balance between the drive tines. Macy does not show or suggest either the application of balancing masses to the front and rear surfaces of drive tines or trimming balancing masses on opposite sides of the drive tines to reduce quadrature displacement without affecting mass balance between the drive tines.

Claims 12 and 13 depend from Claim 11 and are directed to patentable subject matter for the same reasons as their parent claim. In addition, Claim 12 further distinguishes in calling for the step of trimming the masses on same sides of the drive tines to adjust the drive mode frequency of the tuning fork, and Claim 13 further distinguishes in calling for the steps of providing masses on the pickup tines, and trimming the masses on the pickup tines to adjust the pickup mode frequency of the tuning fork.

Claim 14 distinguishes over Macy in calling for the steps of forming a pair of elongated tines which have front and rear surfaces and are disposed symmetrically about an axis, applying balancing masses to the front and rear surfaces of the tines, trimming the balancing masses if necessary to provide a balance in mass between the two tines, and thereafter removing substantially equal amounts of the balancing masses from the front surface of one of the tines and from the rear surface of the other tine to reduce quadrature displacement in the tines and maintain the balance in mass between tines.

Claims 15 depends from Claim 14 and is directed to patentable subject matter for the same reasons as its parent claim. In addition, it further distinguishes in calling for the step of removing substantially equal amounts of the balancing masses from same sides of the tines to adjust the drive mode frequency of the tuning fork.

Claim 16 distinguishes over Macy in calling for the steps of forming elongated pairs of drive and pickup tines which have front and rear surfaces and extend in opposite directions from a central body, applying balancing masses to the front and rear surfaces of the drive tines, trimming the balancing masses if necessary to provide a balance in mass between the drive tines, and thereafter removing substantially equal amounts of the balancing masses from the front surface of one of the drive tines and from the rear surface of the other drive tine to reduce quadrature displacement in the drive tines and maintain the balance in mass between them. Macy does not show or suggest applying balancing masses to the front and rear surfaces of the drive tines, trimming the balancing

masses if necessary to provide a balance in mass between the drive tines, and thereafter removing substantially equal amounts of the balancing masses from the front surface of one of the drive tines and from the rear surface of the other drive tine to reduce quadrature displacement in the drive tines and maintain the balance in mass between the tines. Without those steps, Macy certainly does not anticipate, nor does it render them obvious.

Claims 17 and 18 depend from Claim 16 and are directed to patentable subject matter for the same reasons as their parent claim. In addition, Claim 17 further distinguishes in calling for the step of removing substantially equal amounts of the balancing masses from same sides of the drive tines to adjust the drive mode frequency of the tuning fork, and Claim 18 further distinguishes in calling for the steps of applying balancing masses to the pickup tines and removing substantially equal amounts of the balancing masses from same sides of the pickup tines to adjust the pickup mode frequency of the tuning fork.

It is once again respectfully submitted that the claims are directed to patentable subject matter, and applicant hopes that the application will finally be passed to issue without further delay.

The Commissioner is authorized to charge any fees required in this matter, including extension fees, to Deposit Account 50-2975, Order No. A-68944.

Respectfully submitted,

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